

Abstracts

Oral 10

Respiratory disorders

010.1 INHALATION ACCIDENTS AND NEW-ONSET ASTHMA IN AN INTERNATIONAL GENERAL POPULATION STUDY

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Introduction: The population distribution of irritant induced asthma (RADS) and more generally of asthma symptoms following inhalation accidents has not been well investigated.

Methods: We studied prospectively this association within the European Community Respiratory Health Survey (ECRHS-II) in 6588 subjects who did not report respiratory symptoms or a history of asthma at baseline. During the 9 year follow up, 333 subjects (5%) reported having had an acute unintended exposure to vapours, gas, or fumes and 140 reported subsequent respiratory symptoms. Risk ratios (RRs) for asthma present at the end of follow up were calculated using log-binomial models, adjusted for sex, age, smoking, centre, and occupation.

Results: Increased risk was found for asthma defined by several different criteria. For the combination of asthma attacks, asthma medication and nocturnal breathlessness the RR was 1.7 (95% CI 1.1 to 2.5); for wheeze and nocturnal breathlessness the RR was 2.2 (1.2 to 4.0); for asthma symptoms and increased airway reactivity the RR was 1.6 (0.6 to 4.2). Out of 104 subjects who provided detailed descriptions of the exposure event, 17 were due to fires (RR=3.2, 1.2 to 9.1), 11 to mixing cleaning products (RR=2.6, 0.7 to 9.2), and 76 to spills or other exposure mainly involving irritants (RR=1.5, 0.6 to 3.7).

Conclusions: Around 3% to 6% of all new onset asthma could be attributed to inhalation accidents. Most of these accidents happen at work and contribute significantly to the occurrence of occupational asthma.

010.2 SHORT TERM RESPIRATORY EFFECTS OF OCCUPATIONAL EXPOSURES IN DOMESTIC CLEANING WOMEN

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Introduction: We previously demonstrated that asthma and chronic bronchitis in women employed in domestic cleaning were related to the regular use of bleach and other irritant cleaning products. It remained unclear whether short term exposures to irritant cleaning agents could induce acute lung function changes and aggravate respiratory symptoms.

Methods: We conducted a panel study in 43 domestic cleaning women (age 34–65 years) with symptoms of asthma (n=11), chronic bronchitis (21), or both (11) recruited from a large community based study in the Barcelona area. For 15 consecutive days participants performed peak expiratory flow (PEF) measurements three times a day, and recorded a daily severity score (0 to 4) for seven respiratory symptoms. Cleaning tasks and products in all homes where employed and in their own homes were recorded daily. Symptom severity scores were summed separately for upper respiratory symptoms (URS) and lower respiratory symptoms (LRS) and then dichotomised using a cut off point of 2. Associations between daily cleaning exposures, symptoms and PEF were evaluated using multiple logistic or linear mixed regression analyses adjusted for individual (random) and potential confounders at both individual and day level.

Results: Women cleaned on average 16 hours/week (range 3–52) in other homes. LRS were reported by 37% of the women and were more common on working days; OR 4.3; 95% CI 1.7 to 11. Prevalence of LRS increased with total duration of cleaning activities; OR 2.0 (0.7 to 5.6) and 5.6 (1.7 to 19) for 4–8 hours and >8 hours, respectively, as compared with <4 hours. LRS were independently related to the use of air refreshing sprays (OR 6.5; 2.1 to 20), degreasing sprays (OR 2.6; 1.1 to 6.6) and diluted bleach (OR 2.5; 1.1 to 5.8). URS and PEF were less obviously related to cleaning exposures.

Conclusion: Domestic cleaning women with asthma and/or chronic bronchitis show a short term increase in lower respiratory tract symptoms on working days and on days using irritant cleaning products including sprays.

010.3 FORMALDEHYDE EXPOSURE AND RESPIRATORY SYMPTOMS IN NEW ZEALAND PLYWOOD MILL WORKERS

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Introduction: In an earlier study of occupational exposures and respiratory symptoms in a New Zealand plywood mill we found an association between asthma symptoms and duration of employment, but no clear association with any specific exposure (inhalable dust, bacterial endotoxin, resin acids, or terpenes) except for formaldehyde. Workers with high exposure had a higher prevalence of asthma (36.4%) than those with low exposure (7.9%, adjusted OR (95% CI) = 4.3 (0.7 to 27.7), although exposure estimates in this study were based on only 22 measurements. The current study aimed to examine further the association between formaldehyde exposure and respiratory symptoms with more subjects and improved exposure assessment.

Methods: An identical respiratory health questionnaire was administered to employees of another plywood mill (combined n=201), and personal exposure to formaldehyde was sampled in both mills (n=178). The association between symptoms and three job title based mean exposure categories was examined.

Results: The measured levels of formaldehyde ranged from <0.013 to 0.261 mg/m³ (geometric mean (GM) = 0.023 mg/m³, geometric standard deviation (GSD) = 2.356), well below both the current NZ Workplace Exposure Standard-Ceiling (1.25 mg/m³) and the ACGIH TLV-Ceiling of 0.37 mg/m³. The exposure categories explained 36% of the variability observed, with a significant (p<0.001) difference between the low and high categories. Asthma symptom prevalence overall was 17.4%, and asthma symptoms were reported more frequently by workers with high exposure (21.1%, adjusted OR=1.63 (0.6 to 4.4)) than those with medium (18.2%, adjusted OR=1.22 (0.5 to 2.8)) or low exposure (15.5%). There was also an association with duration of employment, with an adjusted OR of 2.84 (0.96 to 8.39) for those employed for more than five years.

Conclusions: Although formaldehyde levels measured in these two plywood mills were considerably lower than those reported previously, an association with asthma symptoms is suggested. A larger study is required to confirm whether the symptoms observed are caused by formaldehyde or other exposures.

010.4 CHRONIC BRONCHITIS AMONG PULP MILL WORKERS EXPOSED TO GASSINGS

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Introduction: The aim of the study was to investigate whether high exposure to irritant gases increased the risk of chronic bronchitis. An increased risk for adult onset asthma and exposure to gassings has been shown in this cohort.

Methods: The study was designed as a retrospective cohort study, and the cohort encompassed all workers from five pulp mills employed for more than six months between 1970 and 2000. A comprehensive questionnaire with items about exposure, respiratory symptoms, and

diseases was answered by 3226 subjects, 85% males. Gassings were defined as self-reported peak exposures to irritant gases giving rise to respiratory symptoms. The irritant gases were mainly sulfur dioxide and/or chlorine/chlorine dioxide but could also be other irritants. Exposure was defined as gassings. Unexposed were workers not exposed to irritant gases or gassings. Chronic bronchitis was defined as self-reported daily cough with phlegm more than three months a year for two years or more. The workers were divided in four groups; unexposed and exposed never-smokers ($n=819$ and $n=585$) and unexposed and exposed ever-smokers ($n=731$ and $n=607$) and odds ratio for chronic bronchitis were calculated in logistic regression comparing the exposed groups with that reporting no exposure to irritant gases or smoking adjusted for age and adult onset asthma.

Results: Exposure to gassings was reported by 38% of never-smokers and 42% of ever-smokers. Among the mill employees 4.0% and 6.8%, respectively reported chronic bronchitis. The risk for chronic bronchitis was increased among those reporting gassings compared to unexposed (13 cases), among ever-smokers OR 4.3, 95% CI 2.3 to 8.2 (53 cases) and among never-smokers the risk was OR 3.6, 95% CI 1.9 to 6.8 (42 cases). For unexposed ever-smokers the risk was OR 2.5, 95% CI 1.3 to 4.9 (33 cases).

Conclusions: Irritant gas exposure especially peak exposures give an increased risk for chronic bronchitis among pulp mill workers. The risk among exposed never-smokers was higher than among unexposed ever-smokers. Peak exposures must be prevented.

○10.5 EXPOSURE LEVELS OF FLOUR DUST IN BAKERIES: RELATION TO NASAL/BRONCHIAL SYMPTOMS, NASAL α_2 -MACROGLOBULIN/ECP, AND NASAL EXUDATIVE RESPONSIVENESS TO HISTAMINE

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Introduction: The aims of this study were to examine the relation between flour dust exposure, airways symptoms and indices of plasma exudation (nasal lavage fluid levels of α_2 -macroglobulin), and eosinophil activity (levels of ECP) in an occupational setting. Furthermore, to examine the relation between flour dust exposure and the exudative responsiveness to topical histamine challenge.

Methods: The 197 employees in six bakeries were interviewed and completed a questionnaire. The criteria for the diagnosis of occupational rhinitis were based on the International Consensus Report on Rhinitis from 1994. Exposure to flour dust was measured as total dust by personal borne closed face 25 mm Gelman dust sampler. On the basis of their approximate exposure level at work during the 12 months before the investigations the workers were categorised in to four categories (<1 mg/m³, 1–2 mg/m³, 2–4 mg/m³, and >4 mg/m³). Nasal lavages with and without histamine in the lavage fluid were carried out using a nasal pool device.

Results: There was an increasing prevalence of occupational rhinitis, and lower airways symptoms with increasing exposure levels. The workers exposed to more than 1 mg/m³ were more likely to have the diagnosis of occupational rhinitis and asthma symptoms at work. Nasal lavage was well tolerated and could easily be performed in the bakeries. Both α_2 m and ECP levels increased with increasing levels of exposure. There was a higher nasal mucosal responsiveness at the exposure levels 1–2 mg/m³ and 2–4 mg/m³ compared to the group <1 mg/m³.

Conclusion: There is a dose-response relation between flour dust exposure levels and airway symptoms, as well as between flour dust exposure levels and nasal mucosal inflammation and responsiveness. The high prevalence figures of airway symptoms in bakery workers are supported by objective indices of nasal mucosal inflammation and increased exudative responsiveness.

○10.6 SHORT TERM CHANGES IN PEAK EXPIRATORY FLOW FOLLOWING CEMENT DUST EXPOSURE IN NON-SMOKING FACTORY WORKERS

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Introduction: Exposure to cement dust is known to cause acute ventilatory function impairment. However, there is no information on the reversibility of the impairment after the workshift.

Methods: Twenty five non-smoking male cement workers; 15 dust exposed from six work areas and 10 controls from two work areas were recruited and studied between June and August 2002 as part of a larger epidemiological study of assessing cement dust exposure and respiratory health effects in a cement factory. Peak expiratory flow (PEF) was recorded at preshift (PEF₀; 7.00–7.30), postshift (PEF₁; 15.00–15.30), 3 hours postshift (PEF₂; 18.00–18.30), and 6 hours postshift (PEF₃; 21.00–21.30) using a portable PEF meter. Personal total dust exposure was also measured with 37 mm Millipore cassettes from the eight work areas.

Results: The total dust concentration was significantly higher in the dust exposed work areas (geometric mean (GM) in mg/m³: crusher 13.5; crane 38.6; raw mill 1.8; kiln 2.9; cement mill 3.2; packing 21.3) than in the control work areas (GM in mg/m³: maintenance 1.2; administration 0.3). No significant differences were detected between the dust exposed workers and controls with regard to mean age (40.3 v 42.4 years), employment duration (14.5 v 14.8 years) and ex-smokers (35.1% v 22.2%). For the dust exposed group, a significant decrease in PEF was detected when comparing PEF₀% and PEF₁% (6.1%; $p=0.017$). No significant difference where detected when comparing PEF₀% and PEF₂% or PEF₃%. For the controls, no significant changes were detected. During exposure-response analysis, the GM concentration of each work area was assigned to each member of the work area. An exposure-response relation was found only between the current total dust exposure and the change from PEF₀ to PEF₁ while adjusting for age, employment duration, and ever-smoking, estimated at 0.003 l/s per total dust in mg/m³.

Conclusion: The acute cross shift PEF impairment seems to be partially reversible within 3–6 hours after the workshift. However, it is important to investigate large sample size and all work shifts before drawing definitive conclusions.

○10.7 ASTHMATICS ON SICK LEAVE: A STUDY FROM MID NORWAY ABOUT WORK RELATEDNESS

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Introduction: Asthma is now the leading respiratory occupational disease in industrialised nations. Approximately 15% of asthma in adults is assumed to be of occupational origin. Our previous research on occupational asthma has raised two questions: (1) is reduction of workplace exposure too little emphasised in the handling of persons with work related asthma (WRA) and (2) will anti-asthmatic medication without concurrent reduction of workplace exposure prevent chronic disease? The present study of workers in mid Norway who had been on doctor's notified sick leave due to asthma, was performed to shed some light on these questions.

Methods: A questionnaire was mailed the 824 workers (56% women) aged <55 years who had been on leave due to asthma in the period 2000–03 and who were still alive. We received 591 (72%) responses, 57% from female workers. A case of asthma was defined as WRA if the worker answered positively to the questions; "Have you ever had respiratory symptoms in relation to your work? Did the symptoms improve on absence from work?"

Results: The prevalence of WRA was 70%. Of the 416 persons with WRA, 31% had been affected since childhood; for the rest the symptoms had started in adult age. The prevalence of WRA seemed to be independent of age, and atopy. As a consequence of the disease 39% had changed their work. Workplace exposure had been reduced for 49% of the male and for 39% of the female workers. Approximately 33% of the workers had the same amount of symptoms as when the disease was diagnosed, 15% of them were worse. Fewer than half of the notifying doctors were said to assume that the disease was work related and only 15% of the cases of WRA (22% male, 10% female) had been notified to the Labour Inspection Authorities.

Conclusion: A majority of asthmatics in the present study (70%) had work related disease. Gender and smoking habits influenced the rest. The condition seemed to be underrecognised, especially in women. Only 15% of them had been notified to the Labour Inspection Authority.